AMATEUR SATELLITE REPORT

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AMSAT's Newsletter for the Amateur Space Program. (See last page for details)

Amateur Satellite Report is endorsed by the American Radio Relay League as the special interest Newsletter serving the Amateur Radio Satellite Community

Short Bursts

• The Marshall Amateur Radio Club Experiment (MARCE) was launched on STS 41G at 1103 UTC, 05 Oct. 84. No transmissions from the telemetry package had been heard at press time. The Shuttle had some problems of its own with a stuck Ku-band antenna. This required pointing the shuttle towards the relay satellite (TDRS) to dump data to earth. This may have affected the MARCE GAS #007 package but the extent is not known at present.

• Dave Eanes, N4AZI, has been named AMSAT Emergency Communications Manager. He will be developing a series of Emergency Communications protocols and plans to use Amateur Radio space resources in concert with ARRL and other officials. Dave reports to Operations VP K8OCL in his new capacity. Welcome to Dave!

• Chief Area Coordinator WØCY announces the appointment of Frank Jaworski, K1FJ/9 of Fort Wayne as the new Area Coordinator for the Fort Wayne area of Indiana. Congratulations to Frank on his appointment....and welcome aboard!!

• Tests of ACSB on AO-10 continue from ARRL HQ. Phase 1 tests will continue with at least 3 stations on; one from each of the groups participating in the joint program. Besides W1AW (ARRL), there will be WB6JNN (Project OSCAR) and WA2LQQ (AMSAT). Phase 2 of the program foresees up to 100 experimental stations putting ACSB through its paces. Phase 2 will get under way likely first quarter, 1985.

• UoSAT OSCAR 9 celebrated its third birthday on 6 October! Happy Birthday!

• Mysterious signals from space on 2301 and 2304 MHz are being reported by W4HHK and WA4HGN according to W9KDR at ARRL HQ. Contact aforementioned individuals at 901-853-7373 or Box 73, Collierville, TN 38017 for additional details and guidance.

• UO-11 has captured a clearly resolved CCD image — the best yet according to G3YJO. See UoSAT Bulletin.

• RS-6 is apparently dead. W8JLE says he learned from G3IOR that the Russians were monitoring RS-6 even as it failed. Meanwhile, RS-3 may be showing some feeble signs of returning to life.

• W3IWI has a part-time Bulletin Board System (BBS) on AO-10. It time shares with terrestrial service but is usually available to AO-10 users when the bird is within view of

Bill Brown, K9LF, seated, second from right with his family and hosts at BY1PK, Beijing (Peking). Bill visited China recently. (See *ASR* #85, Letters to the Editor.)

K9LF at the mike of BY1PK.

Washington, D.C. evenings. Downlink frequency is in the vicinity of 145.835 or about 5 kHz up from the nominal packet exchange frequency of the L1 SSC, 145.830.

• According to AD6P, the program of events and presentations for the Space Symposium in Los Angeles this 10 November is coming together very well. Fascinating and inspiring papers on many subjects will be presented. Be there!

• Earlier this year we had planned to publish candidate Director's statements here in *ASR*. However, several factors have now derailed these plans. Two candidates have not sent statements. Two exceeded the word count limit. Since we cannot edit these statements and in the absence of two of them, we reluctantly must abandon our plans to publish as the least unfair course. We'll try again next year. Meanwhile, read your ballots carefully for the candidates's statements.

• Ron Dunbar, WØPN, has won the prestigous Chambers Award of the Central States VHF Society. Pictures of the event soon. Congratulations to Ron!

Opportunity Knocks; VP Departs

AMSAT Vice President for Operations Doug Loughmiller, KO5I, has submitted his resignation in order to devote full time to his new professional responsibilities. John Champa, K8OCL, will fill Doug's term of office as head of one of AMSAT's two main branches.

In a communication with AMSAT General Manager Bill Lazzaro, N2CF, Doug explained that his company has offerred him a major promotion and relocation but that while in training for his new management assignment, his free time would be very limited. According to N2CF, KO5I felt that with so many aspects of the Operations organization in transition, he could not devote the time required to do the job justice. Thus, says N2CF, Doug felt it best to pass the reins to another.

John Champa, K8OCL, currently serves at the Board's pleasure in the capacity of Senior Vice President, an ad hoc designation created to facilitate John's special liaison work with external organizations such as the World Space Foundation, The Independent Space Research Group and others. In his additional capacity as Operations VP John will be responsible for the Field Organization including the Area Coordinators and Net Operations. Together these two groups comprise more than 100 volunteers making them the largest entities in AMSAT.

K8OCL will complete the term of KO5I which runs until the Board of Directors' Meeting on 15 Nov. 84. AMSAT sources suggest the Board may request K8OCL continue on as Ops VP for a full term.

Besides serving as Ops VP, KO5I had been a regular Net Control Station on the AMSAT International Nets on Sundays. He was part of Net Manager W8GQW's crack team of NCS on 15 and 20 meters. KO5I also filled in occasionally for WØCY in the 75 meter Mid-America Net operation. Doug has already moved to his new assignment in Charlotte, N.C.

Speaking on behalf of AMSAT, Executive Vice President WA2LQQ said: 'Doug has been a vital cog in the AMSAT organization for several years. He will be sorely missed. Persons of his talent are very rare and we can never find enough of them. We wish Doug well in his new job and hope that when his duties allow, he will again seek us out and rejoin us actively in a position of responsibility.'

KO5I was featured in *ASR's* Spotlight in 1982 (*ASR*# 25, Jan. 18, 1982.)

WØCA Sweeps AMSAT-Stoner Cup By Wide Margin

Nick Laub, WØCA, showed what can be done when a competant operator, a first rate station and some free time can be parlayed. It comes out a big score! That's just what happened when WØCA, operating from his summer home in northern Minnesota racked up nearly 4 million points in the AMSAT-Stoner 25th Anniversary Challenge Cup.

Second place finisher was SV1OE. K3SA took third.

WØCA finished with 3,959,296. That was more than double that of SV1OE who garnered 1,580,128. Third place was well back with 316,370 by K3SA.

Walt Rader, doing yeoman duty as scorer, says three stations were disqualified for exessive duplicate grids.

First in the Competitor Class was W2MTA with 77,214. Second went to JH1UUT with 13,653 points.

Meanwhile, Don Stoner, W6TNS, of Mercer Island Washington, has told *ASR* that he will be in Los Angeles at the Annual Meeting to present the AMSAT-Stoner 25th Anniversary Challenge Cup to the winner, WØCA. Nick and his wife will both be traveling to Los Angeles for the presentation. The Challenge Cup is named after W6TNS in honoring him as the nominal 'inventor' of the OSCAR concept. An article of Don's in his CQ magazine column in 1959 is generally credited with being the catalyst behind the formation of Project OSCAR and the building and launch of OSCAR 1 in December 1961.

Challenger Class Finishers: Top Ten

1.	WØCA	3,959,296
2.	SV1OE	1,580,128
3.	K3SA	316,370
4.	JA1CG	160,678
5.	W7OTC	119,928
6.	WB4OSS	77,622
7.	W3KH	67,355
8.	K4TWJ	27,956
9.	WD4AHZ	20,398
10.	WD4HWO	18,468

Competitor Class Finishers: Top Two

1.	W2MTA	77,214
2.	JH1UUT	13,653

VITA Announces Grant For PACSAT R&D

VITA, the Volunteers In Technical Assistance, has announced the receipt of a $5,000 unrestricted grant from the Tektronix Foundation of Beaverton, Oregon. According to VITA, the grant will be applied to PACSAT for continued research and development (R&D) work.

VITA has joined with AMSAT in a joint project to develop a system of digital store and forward satellites. VITA will use the technology to provide information directly to consumers in third world nations in order to improve the general quality of life by providing access to technical experts. These experts could help remotely with complex technical projects via the communications link the satellite would provide. AMSAT seeks to apply the store and forward PACSAT concept to Amateur Radio work.

Tektronix is a major manufacturer of test equipment. Their major products are oscilloscopes and spectrum analyzers.

According to VITA, several other grant applications are pending including a seed grant from the International Development Research Centre in Ottawa, Ontario, Canada.

AMSAT has also applied for a research grant from NASA for PACSAT work. AMSAT expects to have word on that application's success this month.

Awards To Honor Service, Innovation, Committment

AMSAT Executive Vice President WA2LQQ has announced a series of awards to honor public service through satellites, technical innovation and committment to Amateur Satellite activities.

The first award to be instituted is the 'Bruce Sherman Memorial Satellite Public Service Award.' Named in memory of KA2JTS [see related story], this award will be made annually at the AMSAT Annual General Meeting to the individual who, through his or her use of Amateur Space resources or related facilities connected with Amateur Space, best signifies the spirit of public service which Bruce Sherman himself personified. The awardee shall be selected from among qualified nominees by a select panel of senior AMSAT members. The award will consist of a citation, a plaque signaling the award and a notable cash honorarium. The first awardee will be selected in 1985 and the premiere award will be made at the 1985 Annual General Meeting. The plaque will be displayed at the 1984 Annual General Meeting.

According to WA2LQQ, 'This award is to symbolize the love we have for our lost colleague and brother and concurrently to recognize and encourage others of similar persuasion.'

In a second award institution, the Technical Achievement Award program is nearing fruition. In this area AMSAT is formulating a broad technical achievement recognition program designed to foster innovation, sound engineering and emphasis on the technical aspects of Amateur Satellite activities.

The AMSAT Technical Achievement Awards Program will have several components. First, there will be an annual award for the most innovative development in the Amateur satellite field for the year. Second, there will be a series of on-the-air tests to assess your satellite receiving capabilities. If you qualify, you'll receive a handsome certificate award citing your achievement.

Here are the details on the Technical Achievement Awards Program.

The AMSAT Technical Achievement Award will be made annually to that individual or those individuals who, in the prior year, has (have) contributed most notably and significantly to the development of any aspect of AMSAT-related technical actvities. This may be achieved through innovation, invention, discovery, a pivotal paper or worthy enterprise in the field. The awardee shall be selected from among qualified nominees by a select panel of senior AMSAT members. The award will be made annually at the AMSAT Annual General Meeting and will consist of a citation, a plaque signaling the award and a notable cash honorarium. The first award shall be made at the 1985 Annual General Meeting. The plaque will be displayed at the 1984 Annual General Meeting.

The second component of the Technical Achievement Award Program will be the ZRO Memorial Ground Station Engineering Award. This award, available in progressively higher grades representing incrementally improved station performance, will be available to all AMSAT members who can demonstrate superior satellite station performance in any of several parameters. The first series of ZRO Memorial Ground Station Engineering Awards will be made for Mode B receive sensitivity performance. Later, additional challenges will be added. This award is dedicated to the fond memory of Kaz Deskur, K2ZRO, of Endicott, N.Y. who died earlier this year. Kaz (Kay) had been an AMSAT pioneeer and was father of the famous Satellabe...one of the first of the manual tracking systems available for the early OSCARs. The first trial runs for the ZRO Memorial Award will be announced shortly.

According to WA2LQQ, the overall Technical Achievement Awards Program which includes the ZRO Memorial Award, will be expanded from time to time to include other aspects of recognition for superior technical innovation and achievement within the field of Amateur Satellites and Amateur Space technology.

In remarks on the 75 meter net recently, WA2LQQ said: 'We are pleased to establish and underwrite these awards on behalf of AMSAT in that we personally knew and deeply admired both commemorated individuals [KA2JTS and K2ZRO] and wish that through these living memorials the memory of these two distinguished friends shall live on and be known broadly. We are happy and proud to recall how each of these colleagues positively affected our life. We only regret that notoriety for their achievement follows their untimely demise. May they rest in peace and be eternally blessed in His presence.'

Tribute To A Friend Gone Too Soon

Editorial by WA2LQQ

People come into Amateur Radio for a wide variety of reasons. Some see it as adventure; new places to talk to...new people to meet...new perspectives on the wide world.

Others, I'm convinced, see Amateur Radio as a learning

experience. They seek to learn how radios work, what makes the ionosphere work, how radio signals get from here to there... and back...how to track satellites.

Still others, I suppose, see this fascinating hobby as a challenge to be met head-on. These folks, likely as not, will find challenges equal to their fortitude in contests and various other competitive avenues.

Amateur Radio as society in microcosm; an interesting way to meet and make new friends; to socialize with folks of similar propensities; perhaps even similar eccentricities!

A select few find in Amateur Radio not a channel for competitive urges nor a conduit for manifold ego fulfillment. Rather these select few focus on Amateur Radio as a logical, perhaps even tailor-made vehicle for the expression of their fundamental public service orientation. Seems that just as a compass, freed of its tether always points North, these folks, free to do what they like best, choose to serve others as their direction in life.

These folks are truly extraordinary in an extraordinary hobby.

We were fortunate enough to have known a young man who approached his Amateur Radio hobby as he did most of his other activities: as a way to serve his fellows and his community.

As Captain on the town Volunteer Fire Department, he would dash from his bed into a formidable fire if service called.

As a licensed Emergency Medical Technician, he bid life stay in broken bodies; shattered hopes; lost dreams.

As friend and neighbor he was always at hand to help set a guy, hoist an antenna, give a pull or a push, or just to console and commiserate.

We buried Bruce Sherman, KA2JTS, recently. His death was the culmination of a senseless series of events that ended in a classic collision of good and evil when his path crossed that of a stolen car. Both Bruce and the driver of the stolen car (who was later determined to have been drunk) were killed instantly. The crash, at closing velocity exceeding 130 mph, was simply not survivable.

How many times had Bruce pulled open a wreck to free the victims? Now his colleagues on the Fire Department and Rescue Squad could only grieve at our collective mortality; at the irony. Having saved others, having prepared to help all, Bruce could not have saved himself from the onrush of destiny. There was (is) nothing to be done. He was gone. Forever.

Looking beyond this tragedy is difficult now. 'Twill likely always be so. More difficult still is finding meaning in this awful twist of fate; this gasping irony. Few answers are satisfying.

The fuller story of how this young man served his fellow man for years despite his youth is a clear message to all who listen and know the meaning of devotion to others; of public service.

Suffice it here to say Bruce was an inspiration to us and to all who knew him. He will be missed always as a friend, colleague, brother and so much more. Truly his kind pass here only rarely.

Silent Key Bruce Sherman, KA1JTS, shown at the controls of satellites Westar IV and V. Bruce was a system engineer and controller at Western Union's Glenwood, N.J. earth station until his untimely death returning home from work early on 15 Sept. 84. Bruce's strong orientation towards public service is the inspiration for a memorial award to be made annually in his honor. See accompanying story.

Bruce Sherman, KA2JTS, 1952-1984.

[Bruce Sherman of Chester, N.Y. was an engineer at the Western Union Satellite Earth Station at Glenwood, New Jersey. He was returning from work just after midnight, 15 Sept. 84, when he was killed. He was in communication on 2 meters when the stolen car, traveling at least 80 miles per hour came around a curve on the wrong side of the road. He never knew what hit him. Although not an AMSAT member at the time of his death, he had listened to the 75 meter nets regularly, had talked on AO-10 from WA2LQQ and was preparing to get on packet radio with a TAPR board. Four days before his death he asked for an AMSAT Membership application.]

UoSAT Bulletin-95 5th October 1984

UoSAT Spacecraft Control Centre, University of Surrey

UoSAT-OSCAR-9's Third Birthday

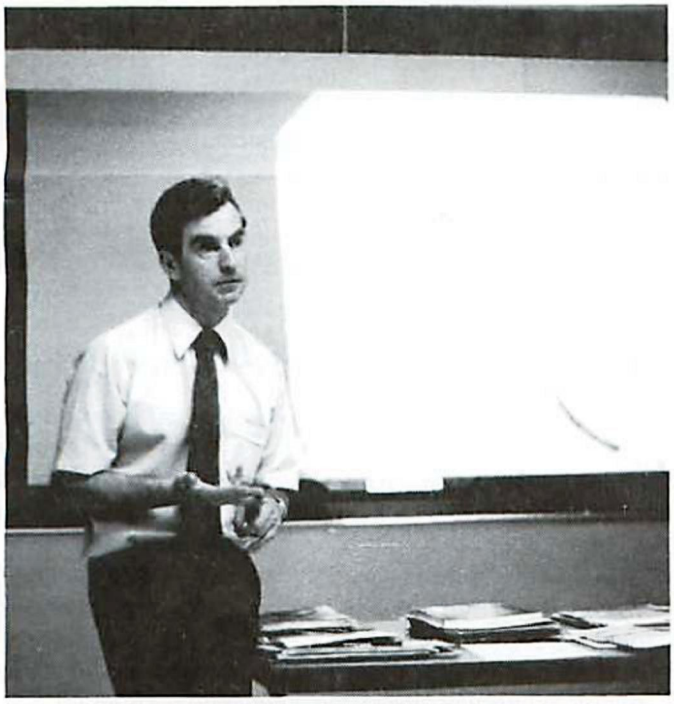
UO-9 was launched at 11:27 gmt on 6th October 1981 from Vandenberg AFB, California into a 554 km sun-synchronous, polar earth orbit by NASA DELTA-2130.

A great deal has happened since that day, both on the spacecraft and on the ground. UO-9 took a little while to 'tame' — the difficult command links caused the commissioning phase to stretch longer than anticipated and gave rise to the well-remembered months of 'steady tone' while UoS and SRI fought to regain use of the spacecraft. Those months (5) were put to good use upgrading the ground station and, following the successful recovery of the spacecraft, great strides were made with the activation of the on-board experiments and particularly navigation and attitude con-

trol. The complex and difficult despin and attitude manoeuvres culminated in temporary gravity-gradient stabilisation, however the magnetometer cables on the boom became tangled during deployment and the boom had to be retracted. The spacecraft was then spin stabilised and the remaining experiments activated. A weekly schedule of daily experiments have been executed for the last two years including a weekly news Bulletin Service; CCD image data; Radiation Experiment data, computer-generated telemetry, DIGITALKER and whole-orbit telemetry surveys. The Bulletin service has been especially successful for maintaining the user community in close contact with spacecraft operations; future mission proposals and more general space news. The DIGITALKER experiment has had a profound impact in schools and colleges worldwide due to its vivid demonstration of low-cost, simple satellite groundstations. The CCD camera has not yielded the hoped-for image quality, but regular image dumps have stimulated interest in image processing and acted as a development tool for the UO-11 CCD Experiment. The best image thus far was received this week!

UoSAT-1 has not exhibited any measurable degradation since the failure of the secondary computer memory devices in the summer of 1982 and the rate of decay of the orbit has been much less pronounced than was anticipated — giving rise to an extended orbital lifetime of, perhaps, another two years?

HAPPY BIRTHDAY UOSAT-1
OCTOBER 6 1984
from the UoSAT Team and
the many experimenters worldwide



VE2ASL gives a presentation on AO-10 last April to the Sherman Radio Club in Sherbrooke, Quebec. Bob is a regular contributor to the RAQI Journal. His most recent article explains how to get started in AO-10 work.

The UoSAT Team at Surrey would like to take this opportunity to thank the many experimenters for their participation, support and patience (!) during the mission thus far and we look forward to more exciting projects.

General News

AMPTE-UKS Spacecraft Update

The three Active Magnetospheric Particle Tracer Expt. (AMPTE) spacecraft launched successfully by NASA DELTA from Cape Canaveral on Thursday 16th August are reported to be functioning well. UoSAT contributed some signal processing modules to the UK satellite. Lithium releases have been successfully completed on Sept. 11 and 20th and the major barium release of 10E25 ions is currently scheduled for Christmas day 1984. This release should give rise to a spectacular artificial 'comet' visible to the naked eye from the ground.

Some experiments have been scheduled with UO-11 — more later in the Bulletin.

NOAA-9

The launch of NOAA-F (9) has been set for the 12th of November.

UoSAT-Oscar-9 Schedule

This weeks schedule is as follows:

Friday -	load Bulletin
Saturday —	Bulletin/DIGITALKER/1200 bps telemetry
Sunday —	Bulletin/DIGITALKER/1200 bps telemetry
Monday —	Bulletin/DIGITALKER/1200 bps telemetry
Tuesday —	CCD Camera — next week Radiation data
Wednesday —	Whole orbit telemetry survey
Thursday —	Computer check-summed telemetry

The 21 MHz Beacon will be in use this week.

CCD Image!!

A routine CCD image taken last Wednesday afternoon contained a close-up view of northern Italy with both coastlines quite clearly defined — the best yet! Does anyone else have hard copy of this image data? As this image was more interesting than usual, it will be repeated next Wednesday (10th) instead of Radiation data.

UoSAT-Oscar-11 Operations

9600 bps data was received successfully for the first time from the UO-11 435 MHz downlink at UoS today (Friday) — work continues!

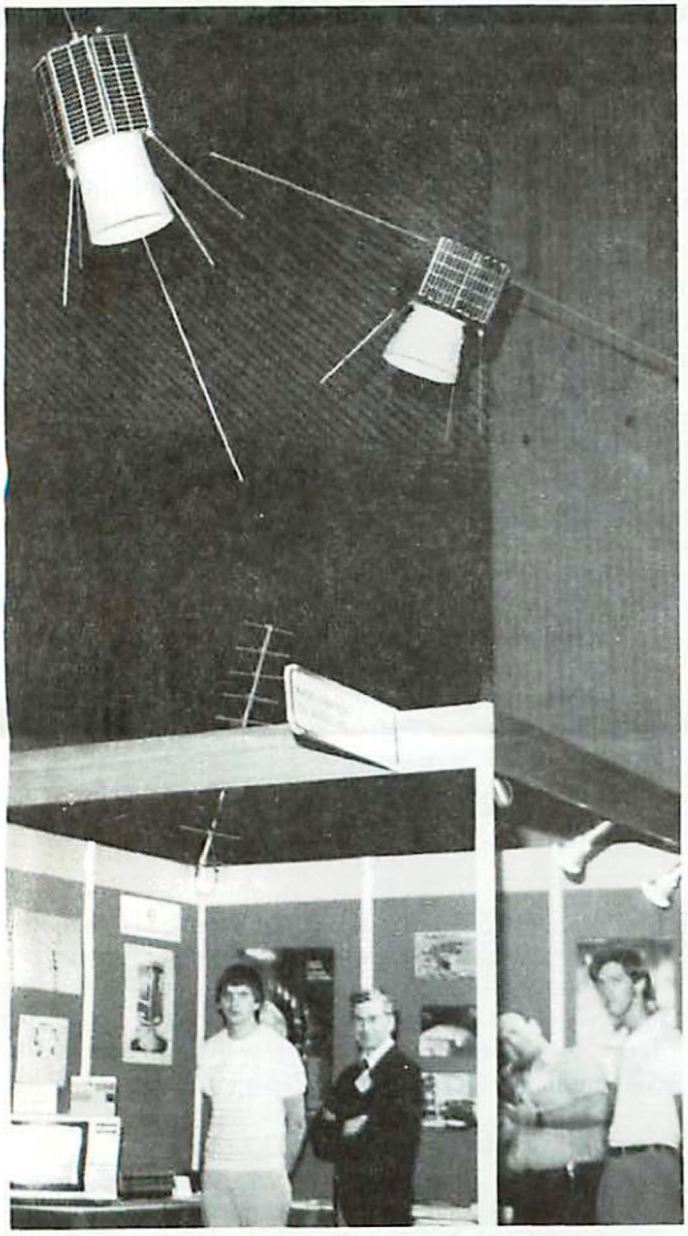
The real-time clock in the standard telemetry frame on UO-11 was reset to GMT (within 4 secs) on orbit 3077 (Fri-

day 28th) to facilitate the data-logging of telemetry. The clock was reset using the spacecraft on-board computer feeding time information to the telemetry system. Sorry it has taken us so long to get around to this task!

Particle/Wave Experiments — UO-11 and the AMPTE spacecraft will be in conjunction for a couple of weeks at the end of October allowing the simultaneous measurement of P/W interactions with UO-11 and UKS. Preliminary tests will be carried out on Monday 081084 to evaluate the P/W experiment in preparation for this experiment. These conjunctions occur only once every six months so we must get going! More details will be given soon.

No CCD images were taken this week as work continues on preparing for the 9600 bps downlink and carrying out DCE rf tests from UoS.

The Particle/Wave experiment channel plate control counter has been checked prior to testing of the Electron Spectrometer next week. A meeting with AMPTE experimenters from the Rutherford Appleton Labs. took place at UoS today (Friday) to discuss the operation of the P/Wave experiment on UO-11. A daily account of UO-11 operations follows:



The RAQI (Radio Amateurs of Quebec, Inc.) booth at the Montreal Science and Technology exhibition. VE2ASL, Bob Sondack, Area Coordinator is seen in dark jacket at center. The exhibition was held in May.

Day	Orbit	Channels	Reset Time
Friday	3082	1,2,3,52	18:09:55 (Telemetry rate set to 300 bps for longer survey!) (six orbits stored at lower sample rate)
Saturday			Six orbit survey dump
Sunday	3108	1,2,3,52	13:05:10
Monday	3120	1,2,3,52	08:50:20
	3121		435 MHz downlink afsk test
	3122		ODATA dump (OBC told to change d/link from ODATA to TLM after 8.5hrs)
Tuesday	3136	1,2,3,52	10:02:39 (OBC told to change d/link from ODATA to TLM after 9.5hrs)
Wednesday	3047		despin to Zspin 4.5 min.
	3151		DCE encoder checkout for LSK
	3152	1,2,3,52	13:18:22 (OBC told to change d/link from ODATA to TLM after 8.5hrs)
Thursday	3164		DCE rf tests using VHF up & UHF down
	3165		DCE rf tests using VHF up & UHF down
	3166	1,2,3,52	12:16:40 (OBC told to change d/link from ODATA to TLM after 8.5hrs)
Friday	3179		set up 9600 bps test data
	3180		435 MHs beacon 9600 bps psk
			nrzi data test (5 mins)

Thanks for Reports & Questionnaire Returns

N6CSI, ZL1GGZ, ZL1PK, ZL1BHX, ZL1UJT, ZL1MO, JE3MXU, F6BVP, G6AAL, WB9ANQ

This week: W7AVE, JA2WO,

Messages

W7AVE DE G3YJO — thanks for the letter, intrigued by your method of decoding 1200 bps Bulletin using 300 bps system! Thanks for the donation too!

Member Recruitment Drive In Full Swing

AMSAT's Second Annual Member Recruitment Drive is now in full swing with the hamfest season having reached a peak in the last few weeks. As was the case last year. the Grand Prize, a Yaesu FT-726R, seems to have galvanized a large number of would-be claimants of the radio into frenzied activity. At press time the leader apparently was KA1M who zoomed into the lead over last year's Grand Prize winner, N3CEG.

Rules for this year's contest are similar to last year's with minor differences. Read the rules below carefully.

At press time donors to the prize bucket were growing with the following on line: Henry Radio, Advanced Receiver

OFFICIAL RULES:
1984 AMSAT Member Recruitment Contest

1. Contest runs until 31 Dec. 84. Member applications must be postmarked before 31 Dec. 84.
2. Points are awarded for new members as follows. One point for an annual member; two points for a member society; three points for a life member. Credit not granted for family members except when additional family members pay the full annual member rate.
3. Scores will be announced publicly periodically. Scores will not be available at AMSAT Headquarters except after the contest is over.
4. Only AMSAT Members may participate. If you become a member, you get one point. If you renew, you get one point. If you upgrade to Life Member (from regular annual member) you get three points. If you upgrade to Sustaining Life Member from Life Member you get one point.
5. Only entries on Official AMSAT Membership Applications will count. Locally reproduced copies of these applications are OK. Applications may be obtained in reasonable quantities for a business sized SASE to AMSAT HQ, P.O. Box 27, Washington, D.C. 20044.
Announcement of the winners will be made not later than 1 Feb. 85. Decisions of the judges is final. In the event of a tie, a random drawing will be held. An applicant becomes a member when payment in full is received. No time payment applications will count for score in this contest.
6. Prizes will be awarded as follows. All prizes will be placed in a pool. The first place finisher will have his (her) choice of any prize in the pool. After the first prize is selected, the second place finisher may select from the remaining prizes. And so on until all prizes are awarded. All prize winners will be announced in *ASR* and other media as appropriate. A complete list of the available prizes will be published in *ASR*.
7. Good luck to all.

Research, VHF Shop, Spectrum West, Lunar Electronics, KJI Electronics, KLM/Mirage, Electronic Equipment Bank, Encomm. Others may be lined up as we proceed. And of course, the Grand Prize, the Yaesu FT-726R goes to the recruiter with the best score as of 31 Dec. 84. So get going.

We'll be tantalyzing your appetites with plugs for the donors and their products over the next few weeks, so get going soon so as to not be disappointed when the big prizes are given out. One of them COULD BE YOURS for just a few hours effort!

Orbit Predictions

By KA9Q

Satellite:	***OSCAR-9***
Catalog number:	12888
Epoch time:	84273.37377839
Sat Sep 29 08:58:14.452 1984 UTC	
Element set:	690
Inclination:	97.6040 deg
RA of node:	249.6657 deg
Eccentricity:	0.0004284
Arg of perigee:	101.7517 deg
Mean anomaly:	258.4210 deg
Mean motion:	15.26432330 rev/day
Decay rate:	2.403e-05 rev/day 2
Epoch rev:	16543
Semi major axis:	6861.590 km
Anom period:	94.337625 min
Apogee:	506.524 km
Perigee:	500.645 km
Ref perigee:	2463.39226358
Sat Sep 29 09:24:51.573 1984 UTC	
Beacon:	145.8250 MHz

Satellite:	***OSCAR-10***
Catalog number:	14129
Epoch time:	84277.06052018
Wed Oct 3 01:27:08.943 1984 UTC	
Element set:	133
Inclination:	25.7678 deg
RA of node:	175.2081 deg
Eccentricity:	0.6053937
Arg of perigee:	311.3032 deg
Mean anomaly:	10.5933 deg
Mean motion:	2.05844218 rev/day
Decay rate:	1.2e-06 rev/day 2
Epoch rev:	983
Semi major axis:	26106.554 km
Anom period:	699.558148 min
Apogee:	35535.433 km
Perigee:	3925.946 km
Ref perigee:	2467.04622498
Wed Oct 3 01:06:33.838 1984 UTC	
Beacon:	145.8100 MHz

Satellite:	***OSCAR-11***
Catalog number:	14781
Epoch time:	84265.21359828
Fri Sep 21 05:07:34.891 1984 UTC	
Element set:	43
Inclination:	98.2318 deg
RA of node:	327.0799 deg
Eccentricity:	0.0013527
Arg of perigee:	351.4789 deg
Mean anomaly:	8.6131 deg
Mean motion:	14.61903966 rev/day
Decay rate:	1.08e-06 rev/day 2
Epoch rev:	2973
Semi major axis:	7062.246 km
Anom period:	98.501682 min
Apogee:	694.114 km
Perigee:	675.008 km
Ref perigee:	2455.21196170
Fri Sep 21 05:05:13.490 1984 UTC	
Beacon:	145.8260 MHz

Satellite:	***RS-3***
Catalog number:	12997
Epoch time:	84271.42223535
Thu Sep 27 10:08:01.134 1984 UTC	
Element set:	103
Inclination:	82.9542 deg
RA of node:	76.3816 deg
Eccentricity:	0.0059111
Arg of perigee:	133.3157 deg
Mean anomaly:	227.2857 deg
Mean motion:	12.15588595 rev/day
Decay rate:	4e-08 rev/day 2
Epoch rev:	12335
Semi major axis:	7987.323 km
Anom period:	118.461131 min
Apogee:	1667.542 km
Perigee:	1573.115 km
Ref perigee:	2461.45256229
Thu Sep 27 10:51:41.381 1984 UTC	

Satellite:	RS-4
Catalog number:	13000
Epoch time:	84264.57512763
Thu Sep 20 13:48:11.27 1984 UTC	
Element set:	220
Inclination:	82.9547 deg
RA of node:	89.8654 deg
Eccentricity:	0.0017040
Arg of perigee:	235.7929 deg
Mean anomaly:	124.1516 deg
Mean motion:	12.06664240 rev/day
Decay rate:	4e-08 rev/day 2
Epoch rev:	12159
Semi major axis:	8026.684 km
Anom period:	119.337257 min
Apogee:	1676.623 km
Perigee:	1649.268 km
Ref perigee:	2454.54654755
Thu Sep 20 13:07:01.708 1984 UTC	

Satellite:	RS-5
Catalog number:	12999
Epoch time:	84270.16226739
Wed Sep 26 03:53:39.902 1984 UTC	
Element set:	191
Inclination:	82.9532 deg
RA of node:	88.4127 deg
Eccentricity:	0.0009736
Arg of perigee:	254.2730 deg
Mean anomaly:	105.7276 deg
Mean motion:	12.05054867 rev/day
Decay rate:	4e-08 rev/day 2
Epoch rev:	12210
Semi major axis:	8033.833 km
Anom period:	119.496634 min
Apogee:	1683.026 km
Perigee:	1667.382 km
Ref perigee:	2460.13789607
Wed Sep 26 03:18:34.220 1984 UTC	

Satellite:	RS-6
Catalog number:	13002
Epoch time:	84268.49867713
Mon Sep 24 11:58:05.704 1984 UTC	
Element set:	88
Inclination:	82.9545 deg
RA of node:	80.2048 deg
Eccentricity:	0.0050224
Arg of perigee:	158.5927 deg
Mean anomaly:	201.7256 deg
Mean motion:	12.13563013 rev/day
Decay rate:	4e-08 rev/day 2
Epoch rev:	12276
Semi major axis:	7996.210 km
Anom period:	118.658857 min
Apogee:	1661.031 km
Perigee:	1580.711 km
Ref perigee:	2458.53490525
Mon Sep 24 12:50:15.813 1984 UTC	

Satellite:	RS-7
Catalog number:	13001
Epoch time:	84275.14840318
Mon Oct 1 03:33:42.34 1984 UTC	
Element set:	173
Inclination:	82.9545 deg
RA of node:	81.7359 deg
Eccentricity:	0.0021848
Arg of perigee:	169.3424 deg
Mean anomaly:	190.8136 deg
Mean motion:	12.08686423 rev/day
Decay rate:	4e-08 rev/day 2
Epoch rev:	12307
Semi major axis:	8017.723 km
Anom period:	119.137600 min
Apogee:	1657.816 km
Perigee:	1622.781 km
Ref perigee:	2465.18728524
Mon Oct 1 04:29:41.445 1984 UTC	

Satellite:	RS-8
Catalog number:	12998
Epoch time:	84271.02350192
Thu Sep 27 00:33:50.565 1984 UTC	
Element set:	293
Inclination:	82.9545 deg
RA of node:	90.0971 deg
Eccentricity:	0.0019055
Arg of perigee:	307.1710 deg
Mean anomaly:	52.7595 deg
Mean motion:	12.02947950 rev/day
Decay rate:	4e-08 rev/day 2
Epoch rev:	12199
Semi major axis:	8043.217 km
Anom period:	119.705927 min
Apogee:	1693.773 km
Perigee:	1663.120 km
Ref perigee:	2461.01131900
Thu Sep 27 00:16:17.961 1984 UTC	

Satellite:	noaa-7
Catalog number:	12553
Epoch time:	84268.00965680
Mon Sep 24 00:13:54.347 1984 UTC	
Element set:	273
Inclination:	99.0574 deg
RA of node:	240.5074 deg
Eccentricity:	0.0013124
Arg of perigee:	173.6948 deg
Mean anomaly:	186.4389 deg
Mean motion:	14.13083789 rev/day
Decay rate:	1.23e-06 rev/day 2
Epoch rev:	16781
Semi major axis:	7224.158 km
Anom period:	101.904785 min
Apogee:	855.746 km
Perigee:	836.784 km
Ref perigee:	2458.04377468
Mon Sep 24 01:03:02.131 1984 UTC	
Beacon:	137.6200 MHz

Satellite:	NOAA-8
Catalog number:	13923
Epoch time:	84247.13108875
Mon Sep 3 03:08:46.68 1984 UTC	
Element set:	92
Inclination:	98.7036 deg
RA of node:	277.1751 deg
Eccentricity:	0.0016362
Arg of perigee:	185.1278 deg
Mean anomaly:	174.9735 deg
Mean motion:	14.22429264 rev/day
Decay rate:	3.8e-07 rev/day 2
Epoch rev:	7455
Semi major axis:	7192.471 km
Anom period:	101.235263 min
Apogee:	826.261 km
Perigee:	802.725 km
Ref perigee:	2437.09691921
Mon Sep 3 02:19:33.819 1984 UTC	
Beacon:	137.5000 MHz

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